



California's Drought Update

Aug 31, 2009

For more information:

Contact:

Drought Operations Center

Phone:

(888) 5-DROUGHT
(888) 537-6844)

E-mail:

drought@water.ca.gov

Drought website:

<http://www.water.ca.gov/drought/>

Introduction

This Drought Bulletin provides a monthly update to California's water conditions. New or additional information is provided this month on hydrologic conditions, the potential impact of developing El Niño conditions in the Pacific Ocean, local drought impacts including groundwater conditions, impacts by hydrologic region, the status of drought emergencies declared by counties, Save Our Water conservation outreach activities, and planning for a dry 2010.

Information in this report is based on hydrologic data compiled through either the end of July, or through late August, depending on availability. Additional drought information can be found on the drought website, <http://www.water.ca.gov/drought/>.

Hydrologic and Water Supply Conditions

Precipitation

Water Year 2009 is the third consecutive dry year for the state. Water Year 2007-08 resulted in 63 percent of average annual precipitation across the state, and Water Year 2008-09 resulted in 72 percent of average annual precipitation. By the end of July, 2009, statewide precipitation stood at 78 percent of average for this water year. End of August and end of Water Year 2008-09 figures are not yet available. Table 1 gives the average monthly contribution to statewide precipitation as well as the current season's measurements through July 31, 2009. As Table 1 shows, this water year has had below normal precipitation thus far, with an exceptionally dry January.

What's New

A developing El Niño is making news this month, with warm conditions occurring over the tropical Pacific Ocean. Public awareness about this climate signal is relatively high, due to the strong coastal storms that have occurred during El Niño episodes. El Niño is forecast to persist and strengthen heading into the winter. This month's report shows they are not always associated with heavy snowpack or increased statewide water supply. See pages 4-7 for more on the latest El Niño conditions.

State of California
Governor
Arnold Schwarzenegger

The Natural Resources Agency
Secretary for Resources
Mike Chrisman

Department of Water Resources
Director
Lester A. Snow

Month	Average Precipitation Statewide (inches)	Water Year 2008-09 Observed Precipitation	% of Average (by month)
October	1.22	0.73	60%
November	2.80	2.49	89%
December	3.91	3.05	78%
January	4.35	1.25	29%
February	3.66	5.03	137%
March	3.12	2.16	69%
April	1.64	0.50	30%
May	0.89	1.49	164%
June	0.35	0.58	166%
July	0.18	0.03	16%
August	0.28	N/A	N/A
September	0.48	N/A	N/A
Total to Date (July 31, 2009)	22.12	17.31	78% to date

Table 1. Average statewide precipitation by month, with current Water Year precipitation through July 31, 2009. Data from California Climate Tracker (Western Region Climate Center) based on National Weather Service Cooperative Observer data.

Reservoir Storage

Statewide reservoir storage at the end of July, 2009 was 80% of average for the date, with individual key reservoirs much lower. Figure 1 shows the condition of the state's larger reservoirs as of August 24, 2009.

CURRENT RESERVOIR CONDITIONS

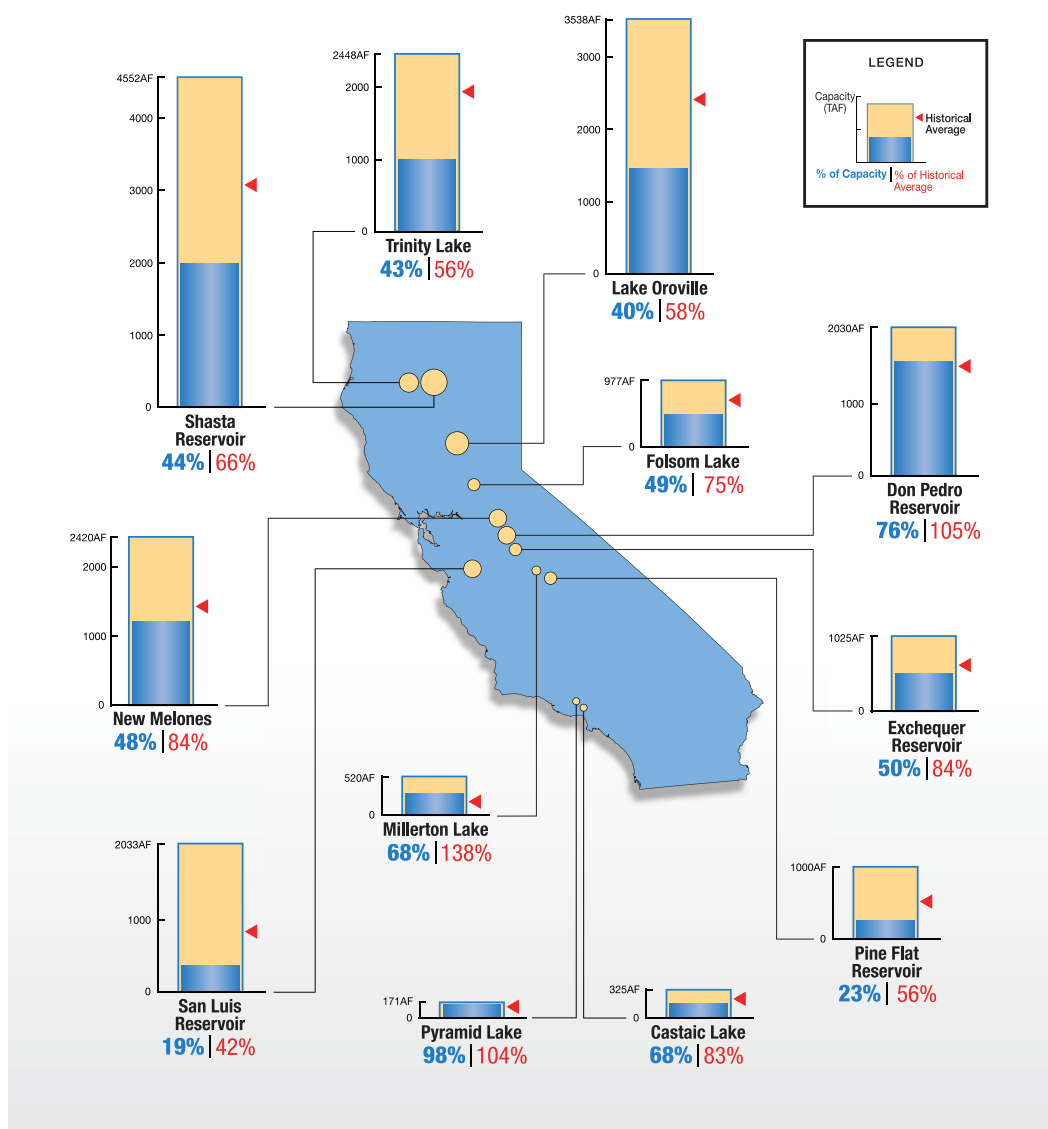


Figure 1. Selected reservoir storage for Aug 24, 2009 (Midnight).

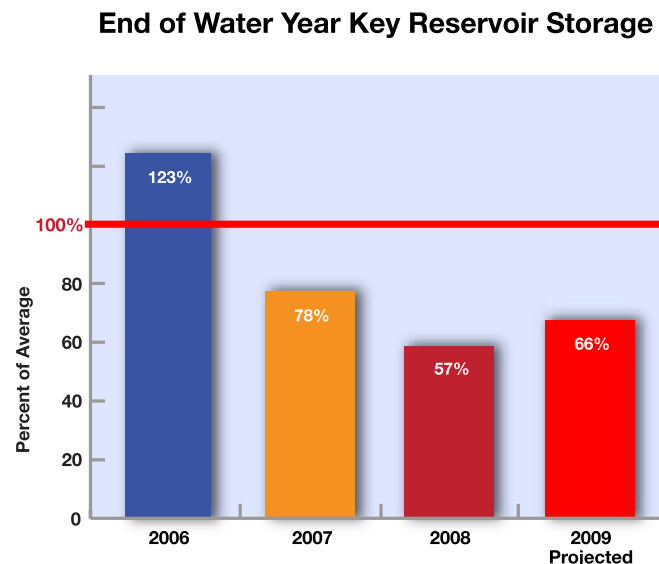


Figure 2. Percent of average storage for the state's key reservoirs at the end of the water year, from 2006 – 2009 (projected). (Trinity, Shasta, Oroville, Folsom, Don Pedro, New Melones, and San Luis)

Figure 2 shows storage for key reservoirs for the end of the last four water years, including a projection for 2009. The three-year drought, from 2006 to the present, is evident in the well-below normal storage readings. The state will enter the 2009-2010 Water Year with its key supply reservoirs at only 66% of average.

El Niño

Overview

El Niño is a warming of sea surface temperatures over the eastern equatorial Pacific Ocean. Depending on the duration and strength of El Niño conditions, weather patterns can be modified across portions of the Northern Hemisphere. As of August 15, 2009, NOAA's Climate Prediction Center (CPC) indicates that warm conditions are in place, and that El Niño is present across the equatorial Pacific Ocean. Current observations and dynamical model forecasts indicate El Niño is expected to strengthen and last through Northern Hemisphere winter 2009. By early winter, the determination will be made as to whether warm anomalies have lasted long enough to be classified as an official El Niño episode (see CPC link below).

Global Average Sea Surface Temperature Anomalies

July 19, 2009 – August 15, 2009

Degrees Celsius

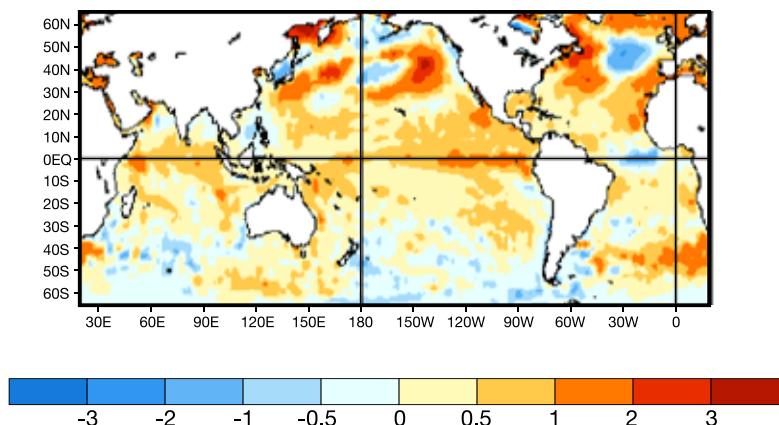


Figure 3. Sea surface temperatures (SST) remain +0.5 to +1.5 °C above-average across much of the equatorial Pacific Ocean. The warmer than average region stretching west from South America along the equator is the signature of El Niño. (Data courtesy National Oceanic and Atmospheric Administration)

Figure 3 shows warm temperature anomalies in red, across the eastern equatorial Pacific. Figure 4 shows a time series of the warm anomalies, as the Pacific sea surface temperatures shifted from cooler to warmer than normal conditions over the past year.

Equatorial Upper-Ocean Temperature Anomalies for the Eastern Pacific Ocean (Degrees Celsius)

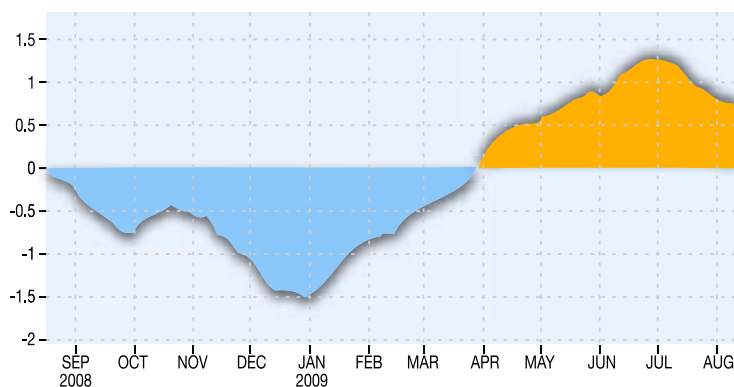


Figure 4. Sea surface ocean temperatures over the eastern half of the Pacific Ocean have had positive (warm) anomalies since April, 2009. The preceding winter had negative (cool) temperature anomalies. (Data courtesy National Oceanic and Atmospheric Administration)

Possibilities / Climatology

For California, El Niño is not an exact predictor for winter precipitation. El Niño episodes are not all alike, varying in strength, duration, and timing. El Niño events have produced wet water years for the state, but have also been in place during dry years.

Table 2 lists the strongest recent El Niño episodes as ranked by the Climate Prediction Center (CPC). A full description of El Niño intensity, methodology, and determination can be found on the National Center for Environmental Prediction website:

<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/MJO/enso.shtml#discussion>

El Niño Water Year	8 Station Percent of Average Precipitation	April 1 Percent of Average Snowpack	Water Year Percent of Average Statewide Runoff	Los Angeles Percent of Average Precipitation*
1957-58	141	171	162	140
1965-66	72	83	77	135
1972-73	103	148	103	141
1982-83	177	227	207	207
1986-87	57	59	52	51
1987-88	69	29	52	83
1991-92	72	60	47	139
1997-98	164	158	169	205

Table 2. Strong El Niño episode water years, percent of normal precipitation over the Northern Sierra 8 Stations (Mt. Shasta City, Shasta Dam, Mineral, Brush Creek, Quincy, Sierraville, Pacific House, and Blue Canyon), percent of normal April 1 snowpack, percent of normal statewide runoff , and precipitation for Los Angeles.

***Note:** Downtown Los Angeles precipitation year runs from July 1 to June 30 of the following year. The rest of the figures refer to water years which run from October 1 to Sept. 30 of the following year.

(Los Angeles data courtesy National Oceanic and Atmospheric Administration)

In order to assess the impact of strong El Niño episodes on California's water supply, Table 2 provides four hydrologic variables. The Northern Sierra 8-Station Index is a measure of water year precipitation for large state reservoir projects. The eight strong El Niño seasons since 1957 have produced a variety of precipitation impacts in that region: three above-average, one near-average, and four below-average years. April 1 snowpack for the Sierra-Nevada Mountains during the eight strong El Niño seasons had four well-above average years, and four below-average years, with one water year especially low, 1987-88. Statewide Water Year Runoff during these events was also mixed, with three above-average seasons, one near-average, and four below-average seasons. Downtown Los Angeles is one general measurement for Southern California annual rainfall. While strong El Niño years produce greater than average precipitation, with two seasons at double the average, not all are wet. Based on these four key variables, El Niño on its own is not a sufficient predictor of the upcoming winter in California; El Niños result in a wide range of wet and dry (above- or below- average) hydrologic impacts.

The timing and strength of the El Niño as well as wind patterns of individual storms determine which parts of the state may receive enhanced precipitation. Strong El Niños do not always correlate with high snowpack and runoff years, but may lead to coastal flooding, especially in Southern California. The public has been made aware of El Niño primarily through news reports of coastal wind, waves, and mudslides (see Figure 5). Stormy coastal weather, though, is not necessarily an indicator of improved statewide water supply.



Figure 5. A huge wave breaks over the seawall at the Golden Gate Bridge and crashes onto a parked car on February 1, 1998. Throughout the following week, high winds and heavy rains combined with abnormally high tides to wreak havoc in the San Francisco Bay region. U.S. Geological Survey scientists have shown that these extreme conditions were the direct result of the 1997–98 El Niño atmospheric phenomenon. (Photo copyright San Francisco Chronicle.)

Looking ahead

This winter's rainfall and snowpack remains uncertain this far in advance, in spite of the continuing development of El Niño. Much depends on how strong the El Niño becomes, how long it lasts, and where heavy precipitation occurs, if it does take place. By early winter, climatologists will have a better idea of the impact of this tropical ocean phenomenon on California's water supply.

State Water Project and Central Valley Project Allocations

South-of-Delta water allocations for the State Water Project (SWP) and Central Valley Project (CVP) continue to remain low. As reported in the previous month's drought bulletin, SWP and CVP allocations remain as shown in Table 3.

Year	Type	CVP Allocation*	SWP Allocation
2006	Wet	100% ag/75% M&I	100%
2007	Dry	50% ag/75% M&I	60%
2008	Critical	40% ag/75% M&I	35%
2009	Dry	10% ag/60% M&I	40%
Ag: Agricultural M&I: Municipal and Industrial *South of Delta			

Table 3. State Water Project and Central Valley Project Allocations

Groundwater Basin Conditions

Figure 6, presented in the previous month's drought bulletin, shows a comparison of Spring 2009 groundwater levels in the Central Valley with historical drought levels for selected wells. It has been revised as of August 20, 2009.

Additional groundwater conditions in selected areas outside the Central Valley can be found at the following link on drought workshop presentations on DWR's drought website, <http://www.water.ca.gov/drought/assist/presentations-2009.cfm>.

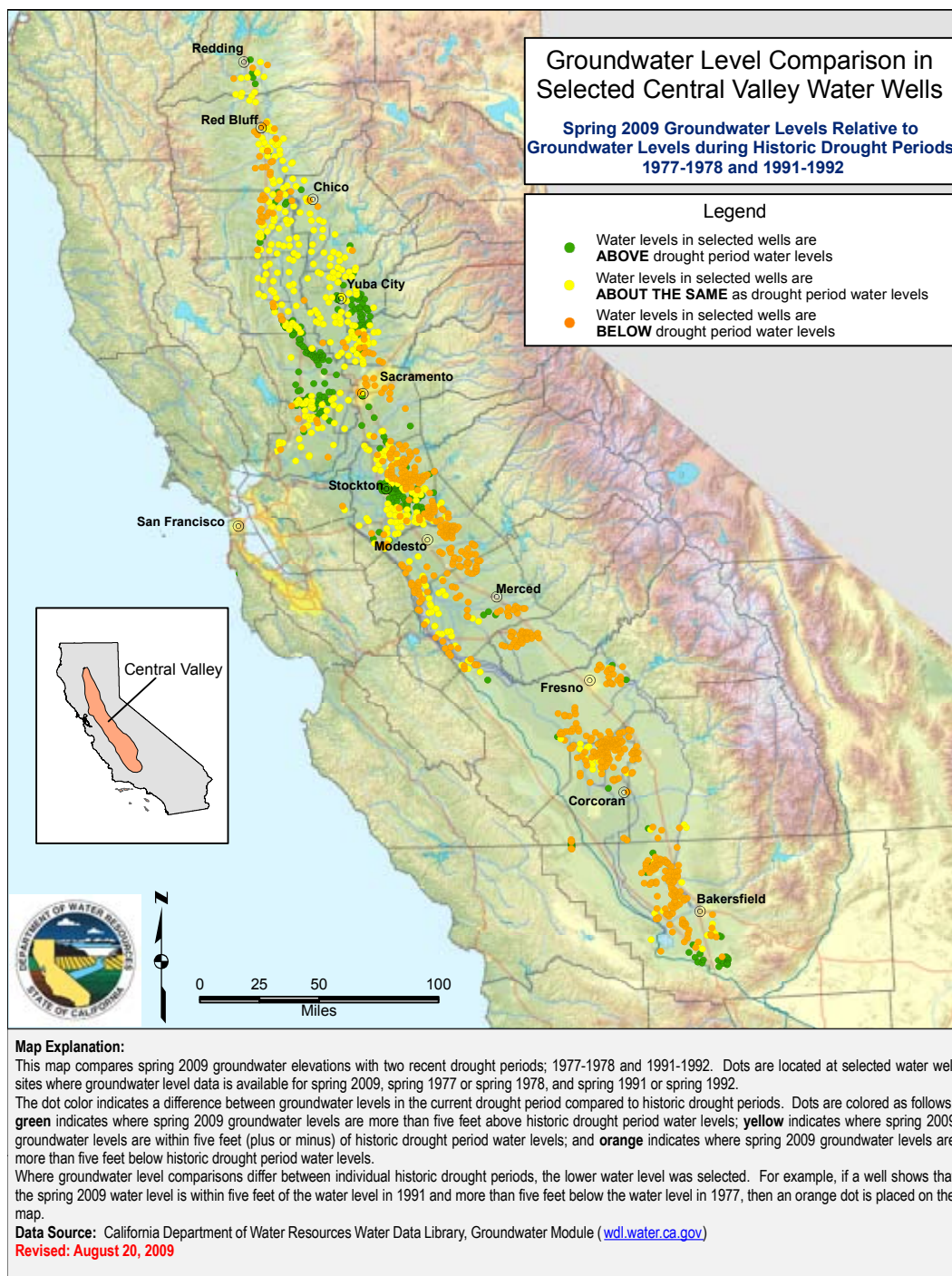


Figure 6. Groundwater Level Comparison in Selected Central Valley Water Wells

Local Impacts and Responses to the Drought

In May 2009, University of California at Davis researchers, using land use data and regional water supply and project delivery forecasts provided by DWR, predicted that anticipated reductions in 2009 SWP and CVP water deliveries would result in lost agricultural gross revenue in the Central Valley of between \$627 million and \$710 million. Impacts from farm losses spread and multiply throughout the Valley's economy, resulting in a forecasted overall loss of gross direct plus indirect income of between \$848 million and \$959 million in 2009. The surface water supply cuts were forecasted to lead to the loss of between 31,000 and 35,000 direct and indirect agricultural full time-equivalent jobs in the Valley. Also, groundwater pumping costs were forecasted to increase between \$148 million and \$154 million as farmers substitute groundwater for lost surface water supplies. UC Davis researchers are now revising their forecasts of 2009 water shortage impacts, and DWR economists are surveying agricultural drought impacts around the state. Results from this new research should be available in time for the September Drought Update.

North Coast Hydrologic Region---Sonoma County Water Agency (SCWA) submitted a petition to the State Water Resources Control Board (SWRCB) on April 6, 2009 to reduce the required in-stream flows in the Russian River below Lake Mendocino. The petition included a projection showing the potential dewatering of Lake Mendocino this September. The SWRCB approved the petition, held a workshop to receive comments, and issued an amended order on May 28, 2009. The order includes conditions requiring a 25 percent reduction in SCWA summer diversions, restrictions on commercial turf irrigation, a plan for Russian River water users to reach water conservation goals of 50% in Mendocino County and 25% in Sonoma County, and increased monitoring.

Storage in Lake Mendocino is currently about 53,000 acre-feet, about the same as it was last year at this time. Reduced releases from Lake Mendocino, the late spring rains, and successful conservation have improved the outlook. The lake level this fall is projected to be higher than the elevation of Redwood Valley County Water District's (RVCWD) intake, but should dry conditions persist into next winter, they could need to take emergency action to supply water to their service area. To conserve water, the RVCWD shut off all agricultural deliveries on May 15, 2009, the Mendocino County Russian River Flood Control and Water Conservation Improvement District reduced their allocation to all contractors to 50 percent, and other area agencies have taken similar measures. The City of Ukiah has expedited the construction of two new wells this summer due to concerns about the reliability of their existing water supply sources. The county has received calls from individual well owners in the coastal area of Mendocino County who are experiencing difficulties with groundwater reliability.

North Lahontan Hydrologic Region---As reported in last month's drought bulletin, the Truckee River Watermaster projects that Lake Tahoe's water level will drop to near its natural rim (elevation 6223 feet) by this December. The water surface elevation was 6223.76 as of August 24, 2009. The last time it dropped below its natural rim was in the

fall of 2004. When the lake level drops below the natural rim no significant releases can be made to the reach of the Truckee River immediately downstream of Lake Tahoe.

Sacramento River Hydrologic Region---Groundwater levels measured in the northern Sacramento Valley at the beginning of August 2009 are about two feet lower on average than during the same period in 2008. Irrigation wells and observation wells show a larger decrease in ground water levels than domestic or other well uses. In general, mid summer groundwater levels in the northern Sacramento Valley are at their lowest levels during the year due to groundwater pumping for agriculture and many groundwater levels are near or at record lows due to the current drought conditions. Comparing the August 2009 data (“dry-year”) with the August 2006 (“wet-year”) data shows ground water levels are about 8 feet lower on average for all well-use types and depths. Irrigation and observation wells are down about 8 to 9 feet. Domestic and other well-uses are down 6.1 feet and 6.9 feet, respectively from summer 2006 to summer 2009. Water levels indicate that the largest impacts are in wells greater than 500 feet deep (approximately 8 to 12 feet lower) and that lesser impacts occurred in shallow domestic wells (approximately 6 feet lower) from 2006 to 2009.

The Yolo County Flood Control and Water Conservation District delivered about 10 percent of normal supplies during a very short irrigation season this year because of extremely low reservoir storage. Combined storage in Clear Lake and Indian Valley Reservoir is currently about 15 percent of capacity, and will approach a historic low this fall, leaving no carryover storage for next year. Due to the shortened irrigation season, there has been a significant decrease in irrigated acreage this summer, and increased reliance on groundwater pumping.

Five water districts in Lake County have urgency ordinances or other drought related measures in effect, and the county board of supervisors approved a phased drought management plan.

As reported in the July drought bulletin, Sacramento’s Regional Water Authority reports improvement in the drought status for some area agencies due to increased allocation from the USBR, but conditions vary. El Dorado Irrigation District and Placer County Water Agency are implementing normal ongoing conservation. The Sacramento Suburban Water District and Orangevale Water Company remain at stage 3 status and have imposed a 20% reduction in deliveries.

Bay Area Hydrologic Region---As reported in the July drought bulletin, several agencies (retail and wholesale) are continuing mandatory conservation, with most of the remaining agencies requesting voluntary conservation. Mandatory conservation ranges from 15% for the Santa Clara Valley Water District to 25% for the North Marin Water District. With late spring rains, increased allocations for South Bay Aqueduct contractors, increased reliance on groundwater pumping, and effective conservation, the need for increased conservation and mandatory measures has subsided. In Napa County, the low allocation from the State Water Project was offset by deliveries from the Drought Water Bank. Groundwater levels are dropping, with some reports of failing wells.

San Joaquin River Hydrologic Region---As mentioned in the previous month's report, many of the county water districts are experiencing water level declines earlier in the year compared to previous years. Other areas in the basin are reported to be stable.

Tulare Lake Hydrologic Region---Groundwater levels are continuing to decline in the Kings Groundwater Basin. The Upper Kings Basin Water Forum, an Integrated Regional Water Management group, is considering a subsidence monitoring project for the area.

Central Coast Region--- In the Central Coast Hydrologic Region, the local water management district reported diminishing numbers of steelhead trout in the Carmel River. The decline of fish population may be a direct effect of the drought because reduced precipitation and lower flows in the Carmel River. Lower flows could also decrease water quality and occurrence of habitat.

South Coast, South Lahontan, and Colorado River Hydrologic Regions--- A survey in April, 2009 of water agencies in the South Coast, South Lahontan, and Colorado River Hydrologic Regions revealed that 17 agencies anticipated a water shortage for the year. In July, 12 of the agencies were surveyed again and nine indicated that they no longer expected a water shortage. Each of these agencies attributes this change in status to the cutbacks made by customers. Conservation through increased rates, tiered rate structures, and drought ordinances were key strategies to accomplishing these cutbacks.

According to the Water Replenishment District of Southern California, Los Angeles County groundwater levels in both the Central Basin's Montebello Forebay and in the West Coast Basin are falling. In the Montebello Forebay, levels are down 40 feet in the past 4 years due to lack of stormwater and disruption of Metropolitan Water District seasonal storage water. Levels in the West Basin are also down due to increase groundwater pumping.

Water Conservation Actions by Local Water Agencies

As of August 25, 2009, there are 65 local water agencies in California that have mandated water conservation and 56 water agencies urging voluntary conservation measures. A current update of the number of agencies mandating conservation and urging voluntary conservation measures can be found at the Association of California Water Agencies (ACWA) website, <http://www.acwa.com/issues/cadrought/map.asp>.

Fresno County Drought Emergency Proclamation

The Governor's Office has appealed the July 24, 2009 decision by the Federal Emergency Management Agency (FEMA) to reject a request by the Governor to declare Fresno County a federal disaster area due to severe drought conditions. Federal assistance would provide food commodities, unemployment assistance, and other assistance. The appeal attempts to demonstrate that local, county, and state resources have been exhausted and federal help is needed.

In Mendota, Huron, San Joaquin, Firebaugh, and Selma food assistance is being provided twice each month through the end of October 2009. At a recent food distribution in Mendota, Fresno County reported that almost 500 people showed up, representing about

2700 family members. Each family is given about 40 pounds of food per person in the household, enough to meet their basic needs for two weeks. Additional volunteers have been requested as the need to provide assistance at giveaways has been projected to increase.

The California Emergency Management Agency (CalEMA) has completed a collaborative 56-page drought concept of operations report to address the preparedness, response, and recovery actions required for current and emerging drought conditions. The report includes preparedness measures by CalEMA, Employment Development Department, DWR, Department of Food and Agriculture (CDFA), Department of Community Services Development, Department of Social Services, and Department of Public Health. The report also includes assistance information, response activities, and recovery efforts and is available on the drought website, under Emergency Assistance at <http://www.water.ca.gov/drought/assist/>.

Mendocino County Drought Emergency Declaration

As reported last month, the Mendocino County Board of Supervisors passed a resolution on March 14, 2009 declaring a local emergency due to drought conditions. A new resolution on April 7, 2009 amended and extended the original resolution and requested technical and financial assistance, equipment, and regulatory relief from the State to mitigate drought impacts. The resolution also requested a federal declaration of emergency and federal assistance. The county supervisors and water agency managers from the Ukiah area met with DWR, CalEMA, and other state agency executives on April 8, 2009 to request assistance with water shortages expected later this year. The supervisors passed an urgency ordinance on July 14, 2009 to establish the necessary rules and regulations on matters related to the local drought emergency, in support of the State Water Resources Control Board's 50 percent water conservation goal for the Mendocino County portion of the Russian River drainage. Mendocino County continues to work on a scaled-down version of a drought action plan to submit to CalEMA, focusing on Redwood Valley County Water District.

Humboldt County Drought Emergency Declaration

Static water levels continue to decline in the South Fork Eel River at the Redway Community Services District (RCSD) diversion structure. In order to meet current demands from their public water supply system, the RCSD has enacted mandatory water conservation and is working with the Department of Public Health for funding improvements to their system. Work is continuing on the design of the improvement work and on obtaining the necessary environmental permits.

Kings County Drought Emergency Declaration

On June 19, 2007, the Kings County Board of Supervisors adopted Resolution No. 07-048 declaring a local emergency on the basis of drought conditions. The Resolution was renewed thereafter bi-weekly; the latest of which was adopted on 11 August 2009 (No. 07-048.57). The Resolution notes the lowering of water tables in irrigation wells

throughout the region and states that for the 2009 growing season in Kings County, the County Agricultural Commissioner's office has predicted a loss of more than \$58 million due to drought conditions. The Resolution authorizes the County Emergency Services Officer to consult and cooperate with Federal and State Officials about mitigating the conditions caused by the drought. The Resolution provides a means to assist rural school districts and community service districts that are not on a rural water system.

Water Conservation Awareness Campaign

DWR and the ACWA continue to expand outreach and promotional activities for the Save Our Water statewide water conservation program.

DWR's State Fair exhibit this year highlights the Save Our Water program, featuring several interactive games for kids and historical exhibits to educate Californians that saving water indoors and outdoors is easy and not a major lifestyle change. Since it launched on April 21, 2009 the program has produced several consumer materials, such as bumper stickers, water-proof decals, brochures and fact sheets, all available on the Save Our Water website. In mid-August the Save Our water website added Spanish-language content that includes an overview of the state's current water shortages and the need to conserve. Tips for conservation inside and outside the home are also included. To visit the Spanish-language portion of the site, find the "Español" link on the homepage at www.saveourH2O.org. Some of the "Save Our Water" downloadable material is also available in Spanish.

The Save Our Water program is designed to educate Californians on the state's water challenges and encourage them to reduce the amount of water they use every day. The statewide program offers consumer-oriented information and tools for understanding of the long-term issues facing the state's water system and practical tips for reducing water use indoors and outside.

Planning for a Dry 2010

DWR has taken immediate action to prepare for the possibility California's drought continuing into 2010 and beyond. In June, July, and August, DWR conducted drought assistance workshops in San Diego, Ukiah, Santa Rosa, and Bakersfield to help urban water suppliers address continuing dry conditions.

This month's Water Plan Advisory Committee meeting included presentations and discussion on actions being planned for a dry 2010 and a 5-year drought contingency plan. The final drought contingency plan will be incorporated into the California Water Plan update and finalized by February 2010. DWR and CDFA are sharing information on drought response actions with New South Wales and Victoria, two states in Australia which are undergoing severe drought conditions.

On August 12, U.S. Deputy Secretary of the Interior David J. Hayes and the Director of California Department of Water Resources Lester Snow held a California Water Issues Forum in Sacramento to discuss California's water challenges and Delta related issues. The forum included a presentation of current dry conditions and planning for a possible

dry 2010. A webcast video and slides of all the presentations can be found on the DWR website, <http://www.water.ca.gov/news/> .

Other drought response actions being planned are increased water conservation, a 2010 drought water bank, a long-term water transfer program, improvements to the California Irrigation Management Information System, and meeting with CalEMA and other state and local agencies to coordinate emergency response activities. For more information on Planning for a Dry 2010, see our DWR link on Drought Planning and Preparedness at <http://water.ca.gov/drought/planning.cfm> .

Summary

This Water Year will be the third dry year in a row for California. Runoff and reservoir storage entering Water Year 2009-2010 will be below average, with key reservoirs significantly lower than average. Emergency declarations are in place in four counties currently experiencing economic or supply difficulties. Drought conditions remain severe at this time, and the developing El Niño over the Pacific Ocean may not improve statewide water supply next year.

A Drought Contingency Plan is being prepared concurrently with the California Water Plan Update 2009. The Drought Contingency Plan will focus on methods to evaluate drought severity, identify impacts from droughts, and suggest measures to reduce the economic, environmental, and social risks and consequences of drought events. A draft of the Drought Contingency Plan is scheduled for presentation at the California Water Plan Plenary Meeting, Oct. 14-15, 2009. A final Drought Contingency Plan is scheduled to be released with the California Water Plan Update 2009 at the end of February, 2010.